



## BOARD OF REGENTS

### SUMMARY OF ITEM FOR ACTION, INFORMATION OR DISCUSSION

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**TOPIC:** P-20 Update

**COMMITTEE:** Education Policy and Student Life

**DATE OF COMMITTEE MEETING:** June 5, 2013

**SUMMARY:** The Vice Chancellor for Academic Affairs' (VCAA) *P-20 and Educational Partnerships* work integrates key priorities of the USM with the key priorities of the Governor's Office, State Legislature, and Maryland Higher Education Commission. This work is organized around the following four umbrella issues:

#### **Academic Innovation and Transformation**

- Course redesign
- Lumina's *Four Steps for Finishing First* and *Higher Education Productivity* policy agendas
- Complete College America (CCA) completion priorities and benchmarks
- Strategic planning for the Center for Innovation and Excellence in Learning and Teaching and related grant projects

#### **K-12 Teacher Preparation**

- New programs for preparing more highly qualified STEM teachers
- Collaborative work with USM education deans to respond to Maryland State Department of Education and national certification and accreditation issues
- Associate of Arts in Teaching (AAT) program collaborations with Maryland community colleges

#### **P-20 Educational Alignment**

- Common Core State Standards
- Partnership for the Assessment of Readiness for College and Careers (PARCC) assessments
- College readiness, remediation/developmental coursework, dual enrollment/early college

#### **STEM**

- Grant-funded projects and partnerships, including MSP<sup>2</sup>, MADE CLEAR, Business Higher Education Forum Cyber Security Network, and STEM migration studies
- USM strategic plan goals for increasing the number of STEM majors and graduates

These initiatives involve support from the entire USM Office. VCAA P-20 staff are supported by Ben Passmore, Rebecca Bell, Bob Page, Eric Nicholson, Anthony Foster, and Monica West in Administration and Finance; Marianne Horrigan, Pam Purcell, Randy Possehl, Jenna Buttler, and Diana White in the University System of Maryland Foundation; and Vice Chancellors Anne Moultrie and P.J. Hogan, among many others. With their support, P-20 staff provide the legislature with data and information on course redesign and academic innovation, the STEM and teacher preparation pipelines, high school-to-college transitions, implementation of

Common Core State Standards and PARCC assessments, and college readiness and remediation.

VCAA's ***P-20 and Educational Partnerships*** agenda reaches across all educational segments and provides statewide leadership and facilitation. Over the past several years, initiatives have been funded through a combination of state funds, state and federal grants, and private foundations. Since P-20 issues involve cross-segmental collaborations, projects are done in partnership with K-12 schools and segmental partners at Maryland Independent College and University Association, the Maryland Association of Community Colleges, Morgan, and St. Mary's. VCAA P-20 staff members are points-of-contact for the Governor's Office and MHEC when addressing cutting-edge policy questions and issues.

The projects described in the attached chart and executive summaries illustrate the range of activities and collaborations that are led out of VCAA's P-20 group.

**ALTERNATIVE(S)**: This is an information item only.

**FISCAL IMPACT**: This is an information item only.

**CHANCELLOR'S RECOMMENDATION**: This is an information item only.

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COMMITTEE RECOMMENDATION:

DATE:

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BOARD ACTION:

DATE:

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**Current P-20 and Educational Partnership Grants**  
**USM Office of Academic Affairs**  
**June 5, 2013**

<b>Project</b>	<b>Funding Source</b>	<b>External Funds</b>	<b>Internal Funds (Match)</b>	<b>Project Duration</b>	<b>Focus and Outcomes</b>
<b>USM Priority Area: Academic Innovation and Transformation</b>					
Course Redesign	Carnegie Lumina CCA	\$2,032,000	Institutional match required (\$20,000 for Carnegie and Lumina, \$10,000 for CCA)	2010-2014	Funds have supported the redesign of 70+ courses statewide to date
Massive Open Online Courses (MOOCs) Study	Gates/Ithaka	\$1,400,000		2012-2014	Will launch 9 side-by-side comparison studies and 9 case studies across USM (and CCBC) this summer and fall
USM Near-Completers	USMF (\$200,000 from account #20147, <i>A Matter of Degrees</i> , and \$50,000 from account #20148, <i>College Completion</i> )	\$250,000		2013-2014	Funds to provide up to 11 grants of \$25,000 to institutions for students nearing completion (>90 credits) of their undergraduate degree (\$20,000 of grant to be awarded as scholarships and \$5,000 for administration)
<b>USM Priority Area: K-12 Teacher Preparation</b>					
Teacher Education/P-20	State line item	\$365,000	Institutions provide \$20,000 match for each grant	2000-Present	Provides 9 annual institutional grants to support teacher education redesign
<b>USM Priority Area: P-20 Educational Alignment</b>					
Common Core/ Postsecondary Collaborative	NGA/NASH	\$65,000	USM senior staff time (Chancellor, SVCAA, AVCAA)	2011-2013	Convene teacher and faculty teams to engage higher education in work associated with the transition to the Common Core State Standards and the corresponding effects on postsecondary education

**Current P-20 and Educational Partnership Grants**  
**USM Office of Academic Affairs**  
**June 5, 2013**

Partnership for Assessment of Readiness for College and Careers	Achieve, Inc.	\$120,000	USM senior staff time (Chancellor, SVCAA, AVCAA)	2011-2013	Support Maryland as a Governing State on PARCC leadership team; support state-level policy development; engage higher education in the development, review, and endorsement of the PARCC assessments
USM Priority Area: STEM					
Business Higher Education Forum	Sloan Battelle	\$134,400 \$25,000	USM senior staff time (Chancellor, SVCAA, AVCAA) and institutional match of \$12,000 for the mini-grants	2012-2015	Mixed methods study to explore factors behind why USM students leave the STEM pipeline and mini-grants to four institutions (BSU, TU, UMBC, and UMCP) @ \$12,000 each to seed early work on USM/BHEF Cyber Network activities; the total mini-grant amount (including institutional match) is \$24,000
MADE CLEAR	NSF	\$7,000,000	President UMCES, AVCAA staff time	2011-2017	Regional climate change educational partnership grant with MD and DE
Minority Student Pipeline Math and Science Partnership (MSP) <sup>2</sup>	NSF	\$12,000,000	AVCAA staff time	2008-2013	STEM pipeline grant involving USM, PGCC, and Prince George's County Public Schools, with a focus on teacher professional development and dual enrollment experiences

SVCAA – Senior Vice Chancellor for Academic Affairs

AVCAA – Associate Vice Chancellor for Academic Affairs

**Academic Transformation Grants: USM Office of Academic Affairs**  
**June 5, 2013**

**Course Redesign**

USM has placed a great deal of emphasis on course redesign as a strategy to improve the student academic experience and performance in high enrollment core and gateway courses. The Carnegie Course Redesign 2 Initiative is available to USM institutions to enable departments to review and redesign courses that have been traditionally taught in a lecture format to large groups of students. A second program, funded through the Lumina Foundation, is available to all public and private two-year and four-year institutions in Maryland. A third program, funded by Complete College America (CCA), is also open to all postsecondary institutions in Maryland, with a specific focus on the redesign of developmental mathematics courses. The Lumina and CCA grants are described in greater detail below. Through these grant initiatives to date, there have been 37 course redesigns at USM institutions, and 31 outside of USM.

***Lumina Foundation Grant (\$1,032,000; 12/2009-11/2014)***

Higher education officials from around the state are partnering to enhance higher education access, retention, achievement, and completion through a grant from the Lumina Foundation. *Growing by Degrees* uses bottom-up campus engagement with multi-segment, state-level investment and coordination. Strategies include not only course redesign, referenced above, but also dissemination of USM's effectiveness and efficiency (E&E) strategies to other Maryland institutions. To date, 19 courses have been redesigned (nine courses at seven community colleges, three courses at three USM institutions, five courses at two MICUA institutions, and two courses at two non-USM public four-year institutions).

***Complete College America (CCA) Grant (\$1,000,000; 9/2011-8/2013)***

USM is partnering with MHEC on Maryland's CCA work. Nationally, CCA is building an Alliance of States "ready to take bold actions to significantly increase the number of students successfully completing college and achieving degrees and credentials with value in the labor market and close attainment gaps for traditionally underrepresented populations." The goals of Maryland's CCA initiative are parallel to the Lumina *Growing by Degrees* project. There are two components of Maryland's CCA grant:

- Transforming remedial courses in mathematics. To date, 16 courses across 14 Maryland institutions have been redesigned (one USM, one non-USM public four-year, and 12 community colleges). CCA grant funds also support faculty fellows who travel throughout the state assisting selected institutions with the development and implementation of redesigned developmental mathematics courses.
- Developing and implementing the Associate's Degree Award for Pre-degree Transfer Students (ADAPTS) Program. ADAPTS ensures that transfer students who either have enough credits, or are a few credits short of receiving the associate's degree, can retroactively be awarded that credential.

**Ithaka/Gates MOOCs Study (\$1,400,000; 11/2012-6/2014)**

In addition to USM's ongoing work in course redesign, Ithaka S+R and USM received a grant from the Bill and Melinda Gates Foundation to launch a new partnership, with an emphasis on assessing the impact of a range of Massive Open Online Courses (MOOCs) in traditional higher education learning environments. Faculty teams have committed to working collaboratively with Ithaka to produce high quality test results assessing the value of integrating learning materials from MOOCs into their courses. While the original target in the grant proposal was to support 5-7 projects, due to faculty interest, a total of 18 projects will launch in courses offered during the summer 2013 and fall 2013 terms at Bowie, Frostburg, Salisbury, Towson, UB, UMES, and CCBC. A series of side-by-side tests will provide the opportunity to compare student learning outcomes in traditional courses versus MOOC enhanced courses, and a group of case studies will examine the faculty and student experience with MOOCs in depth.

## USM 2012-2013 Teacher Education Update

During the 2012-13 academic year, the USM has continued to provide state leadership and support for teacher and principal education. The work falls into four major categories: professional development schools (PDS), Associate of Arts in Teaching degree (AAT), Teacher Education program graduates, and USM teacher education grants.

### Professional Development Schools

USM institutions maintain their status as leaders in the state's movement towards creating and sustaining quality professional development schools for engaged teaching and learning. Currently, 284 Maryland PK-12 schools are part of USM institutions' professional development school networks. Every geographic region of Maryland is represented within the networks.

### Associate of Arts in Teaching Degree Program

#### Associate of Arts in Teaching (AAT) Approved Programs (2005-2012)

The chart below tracks the total number of AAT programs at Community Colleges that have been approved by MHEC for transfer to 4 year universities.

AAT in Early Childhood/Early Childhood Special Education	AAT in Elem. Ed/Elem. Special Ed or Elem. Ed / Generic Special Ed., PreK-12	AAT in Secondary Education Chemistry	AAT in Secondary Education English	AAT in Secondary Education Mathematics	AAT in Secondary Education Physics	AAT in Secondary Education Spanish	Total
14	16	9	8	10	8	7	72

#### Cumulative AAT Degree Recipients (2005-2012)

The chart below tracks the number of AAT students who have transferred from AAT programs into 4-year teacher education programs since AAT began in 2005.

Early Childhood	Elem. Ed	Secondary Chemistry	Secondary English	Secondary Mathematics	Secondary Physics	Secondary Spanish	Total
409	1,304	13	19	31	1	22	1,850

### Teacher Education Graduates

Of the 2,555 newly eligible teacher education program graduates, 1642 graduates were from USM institutions. Content areas identified as critical shortage areas: career and technology, computer science, ESOL, mathematics, chemistry, Earth/space science, physics, special education, Chinese, and Spanish. Notably, the report recommends that the State Board declares that there is a shortage of teachers who are males and teachers who are members of minority groups. (Source, *Maryland Staffing Report: 2012-2014, MSDE*)

### USM Teacher Education Grants

The USM Office of Academic Affairs made \$210,000 worth of institutional grants to seven institutions, which enabled these institutions to make important improvements to their teacher education programs (i.e., fully integrate STEM into teacher education & student learning, implement teacher performance assessments, and studying the impact of RTTT initiatives on teaching practices).

**Common Core State Standards &  
Partnership for the Assessment of Readiness for College and Careers  
June 5, 2013**

<b>Project Work Period</b>	2011-2014
<b>Funding Sources</b>	PARCC (\$120,000) NGA/NASH (\$65,000)
<b>Principal Partners</b>	USM/VCAA Governor's Office Maryland State Department of Education Maryland Higher Education Commission Maryland Association of Community Colleges Maryland Independent College and University Association

**About PARCC**

The Partnership for the Assessment of Readiness for College and Careers (PARCC) is a consortium of 23 states<sup>1</sup> committed to building a next-generation assessment system for elementary and secondary schools that is based upon the Common Core State Standards (CCSS). Of the 22 states, 19 are members of the PARCC Governing Board, which make the strongest commitment to PARCC and its activities and therefore have the most decision-making authority. Maryland is one of the 19 Governing States. The chief state school officers of the Governing States serve on the PARCC Governing Board, while higher education leaders serve on the Advisory Committee on College Readiness (ACCR). Maryland is represented by Superintendent Lillian Lowery and Chancellor William E. Kirwan. These groups are charged with decision making on major policies and operational procedures. Collaboration between Chancellor Kirwan and State Superintendent Lillian Lower represents the highest level of commitment to the implementation of the Common Core State Standards and the PARCC Assessments.

**Maryland's Role and Responsibility**

As a Governing State, Maryland has representatives on the PARCC Leadership Teams for both K-12 and higher education. Maryland's K-12 Leadership Team is led by Henry Johnson, Assistant State Superintendent for Curriculum and Assessment at the Maryland State at the Department of Education (MSDE). The Higher Education Leadership Team is led by Nancy Shapiro, Associate Vice Chancellor of Academic Affairs and Special Assistant to the Chancellor for P-20 Education at USM and Kathy Barbour, Vice President for Academic Affairs and Economic Development at Chesapeake College, representing the Maryland Association of Community Colleges.

**Timeline**

<b>Academic Year</b>	<b>Activity</b>
2012-2013	First year pilot/field testing of the PARCC college-readiness assessment and related research and data collection
2013-2014	Second year pilot/field testing of the assessment and related research and data collection
2014-2015	Full operational administration of PARCC college-readiness assessments
Summer 2015	Set achievement levels, including college-ready performance levels

<sup>1</sup> The 22 Participating States and Governing States (those in bold are governing states) are: **Arizona, Arkansas, Colorado, District of Columbia, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, and Tennessee.**

**Common Core State Standards &  
Partnership for the Assessment of Readiness for College and Careers  
June 5, 2013**

**Challenges**

- Identifying a set of core competencies in English and mathematics reflected in the Common Core State Standards that indicate a student is ready to be successful in entry-level, credit-bearing college courses
- Agreeing on college-readiness standards acceptable to all college and universities within and across states
- Redesigning teacher preparation and in-service professional development to ensure, pre-service and in-service teachers will be able to teach the CCSS and help their students meet standards on the PARCC assessments
- Connecting the current initiatives in the state regarding college preparation, access, and completion to the Common Core State Standards and PARCC assessments
- Monitoring the potential “pushback” against the Common Core in a handful of states including Indiana, Alabama, and Georgia, which threatens the progress of CCSS

**Recent Activities**

- Beginning with the 2011 academic year, the Governor’s P-20 Leadership Council charged the P-20 Workgroup to create three PARCC work groups to establish a process for disseminating information and providing critical advice to the Maryland State Leadership team: USM was charged with organizing state wide groups of English, Mathematics and teacher preparation faculty.<sup>2</sup>
  - The three groups each have over 100 members from K-12 and higher education, with representatives from two-year, four-year, public and private institutions across the state.
  - The members were nominated by chief academic officers and work to serve as liaisons between the Maryland PARCC leadership, institutions of higher education, and on committees to review PARCC assessment items and content.
- In fall 2012, USM was awarded a grant from the National Governor’s Association and the National Association of System Heads (NGA/NASH) for \$65,000 which is being used to convene meetings of the P-20 PARCC work groups, as well as provide stipends to faculty participating in a wide range of PARCC initiatives.
- In an October 2012 joint meeting, the PARCC Governing Board and the PARCC Advisory Committee on College Readiness voted to adopt a College- and Career-Ready Determination (CCRD) policy and Policy-Level Performance Descriptors.
  - The CCRD policy defines the level of academic preparation in English language arts/literacy and mathematics needed for students to be successful in entry-level, credit-bearing courses in two- and four-year public institutions of higher education.
  - These policies establish a common benchmark to define the academic preparation necessary for college and career readiness.
- In fall 2012, PARCC adopted five performance levels, 1 through 5, that classify student performance into categories that describe the knowledge, skills, and practices students in each category typically are able to demonstrate.
- In December 2012, the PARCC Governing Board and ACCR identified the assessments that will be used to determine college- and career-readiness.
  - A student’s performance on the Algebra II assessment and the Grade 11 English Language Arts assessment will signify the degree to which they are college-ready. This was a significant milestone in progression towards implementation of the assessment and its use as a placement tool.

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<sup>2</sup> The Governor’s Workforce Investment Board and MSDE were charged with organizing a Career Readiness work group to provide communication with the workforce and employers in Maryland



**Common Core State Standards &  
Partnership for the Assessment of Readiness for College and Careers  
June 5, 2013**

- In March 2013, PARCC announced the formation of a new non-profit organization to oversee the development of its next generation assessments.
  - Under its new non-profit status, PARCC will become its own legal entity as a 501(c)(3).
- In May 2013, PARCC conducted a second state visit to Maryland to update higher education stakeholders on PARCC's progress and forthcoming releases.
  - Over 70 faculty and members of the P-20 community participated, the majority from the P-20 PARCC work groups in English, mathematics, and teacher preparation.
  - This meeting included presentations from Chancellor Kirwan, Secretary Danette Howard (MHEC), Assistant Superintendent Henry Johnson (MSDE), and Governor O'Malley's Education Liaison, Jared Billings.
- In June 2013, the next meeting of the Governing Board and ACCR will take place where the groups will discuss comparability of the assessment performance scores across states, sustainability of PARCC after implementation in the 2014-2015 academic year, and the end of Race to the Top funding.
  - ACCR will also vote on grade- and subject-specific performance level descriptors which describe the knowledge, skills, and practices students performing at a given performance level (1-5) are able to demonstrate at any grade level.

### **Unresolved Issues**

The complexity of the work on PARCC and the Common Core State Standards requires constant communication and negotiation both within the state and with the national PARCC leadership organization. Currently, there are a number of issues that will drive policy and practice in the state and across the PARCC states. Here are examples of issues that cross between K-12 and higher education:

1. Who decides on the "shelf life" of the assessments? That is, if a student achieves a college-ready determination in 10<sup>th</sup> or 11<sup>th</sup> grade, does the college-ready determination expire?
2. If students apply to Maryland institutions from states that are members of the other consortium (*Smarter Balanced*), do Maryland institutions need to accept those students into college-credit bearing courses without placement testing?
3. What changes will need to be made within the teacher preparation programs to ensure that new teachers are prepared to teach to the new standards?

More information on PARCC and the Common Core, including item prototypes, is available at the PARCC Website.

<http://www.parcconline.org>

# (MSP)<sup>2</sup> Minority Student Pipeline Math Science Partnership

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**Lead Partner:** Bowie State University

**Additional Partners:** Prince George's County Public Schools (PGCPS); Towson University (TU); University System of Maryland (USM), University of Maryland, College Park (UMCP); Prince George's Community College (PGCC)

**Funding:** \$12.4 million from the National Science Foundation, for the period 2008-2013

The (MSP)<sup>2</sup> project aims to establish a strong, multifaceted partnership among the essential P-20 players in one of the largest minority-majority counties in the country (Prince George's County, Maryland) to expand the minority student pipeline into STEM fields in higher education. With a focus on inquiry instruction in science, the partnership uses four separate strategies involving STEM faculty targeted at multiple populations (teachers and students). While still in progress, we have measured important preliminary results in each of these strands of activity:

1. Professional development for 750 teachers of grades 4-8, led by science faculty at UMCP and PGCC. Two different types of professional development are implemented, each designed around principles of teaching and learning through inquiry science.

*Schools with participating teachers have shown a significantly higher increase in average scores on the Maryland State Assessments than schools without participating teachers since before the project began. Students of these teachers have also sustained their interest in science more than their peers over a two-year period.*

2. A total of 110 high school science teachers engage in summer research experiences with UMCP, TU, and BSU faculty. Led by TU, the teachers then participate in yearlong professional learning communities focused on teaching the Nature of Science.

*Teachers involved in this program have a more developed understanding of the Nature of Science and have made important changes to their inquiry-oriented instruction.*

3. At least 375 high-school students over five years are taking challenging science courses through an innovative early college/dual enrollment program developed collaboratively by PGCPS with BSU and PGCC.

*To date, more than 2500 college credits have been earned.*

4. 80 undergraduate science majors have been given opportunities for undergraduate teaching experiences (with 100 PGCPS science teachers to mentor them) and 45 more have the chance to learn more about science teaching by participating in the new Maryland Learning Assistants Program at UMCP.

*Several participating science majors have gone on to pursue teaching careers, and most report significant gains in their understanding of the teaching and learning of science.*

**(MSP)<sup>2</sup>**  
**Minority Student Pipeline Math Science Partnership**

**Intellectual Merit:**

Inquiry instruction, when done properly, is not only a proven method of improving student learning, it is also inherently suited for reducing the achievement gap by requiring the active participation and interactive engagement of all students. This project builds on the most current research in teaching and learning and upon recommendations from the National Academies of Science and the National Science Board that demand a rethinking of approaches to K-8 science curriculum, instruction, and assessment. Their overarching recommendation is that K-8 education should be coordinated around “doing science.” (MSP)<sup>2</sup> is designed around a research plan that will compare different models of inquiry-driven professional development. In addition, the project is in the process of evaluating the impact of science teacher summer research experiences, and the impact of challenging courses and curricula on the STEM minority pipeline from PGCPSS into higher education in Maryland.

**Broader Impact:**

Minorities are underrepresented in STEM disciplines at every level from secondary science and mathematics courses through graduate school. Lack of preparation in mathematics and science among underrepresented minority groups in the early elementary grades undermines enrollment and success in secondary-level school programs and, ultimately, in college and career choices later in life. Prince George’s County is one of the largest majority-minority school systems in the nation, with 132,000 students enrolled in grades K-12 (76% are African American, 15% are Hispanic). If ever this nation seriously hopes to address the opportunities and the challenges of fostering a robust pipeline for bringing underrepresented minority students into STEM professions and fields of study, Prince George’s County offers a worthy case study for such an effort.

**Goals and Objectives:**

Goal 1: Increase the number of minority and other underrepresented students who enter science disciplines.

1. Increase interest in science among minorities at all grade levels: elementary, middle, high school, and college.
2. Improve student achievement in science as demonstrated by engagement in science inquiry activities and on required state science assessments.
3. Increase the number of minority and other underrepresented high-school students intending to major in science and entering science degree programs.
4. Increase the number of minority and other underrepresented undergraduate science majors considering teaching science as a career.

Goal 2: Improve the ability of science teachers in elementary, middle, and high schools to effectively teach science to underrepresented minority students.

1. Improve the quality of student-centered science inquiry instruction by participating grade 4-12 teachers.
2. Increase participating teachers’ conceptual understanding of core science content.

Goal 3: Increase and reward STEM faculty participation in ongoing professional development partnerships with K-12 teachers.

1. Increase STEM faculty participation in K-12 science teacher professional development activities.
2. Strengthen long-term relationships between research scientists and science teachers in partnerships that bring authentic science inquiry to the classroom.
3. Reward STEM faculty for participation in K-12 partnerships.

# Minority Student Pipeline Math Science Partnership

STRENGTHENING THE SCIENCE PIPELINE IN MARYLAND

## Achievements to date

Spring 2013

A report to the Prince George's County Board of Education



# What is (MSP)<sup>2</sup>?

A partnership among PGCPS and four colleges and universities with programs for strengthening the student pipeline into science.

- (MSP)<sup>2</sup> is funded by a \$12.4-million grant from the National Science Foundation.
- The project is currently in its 5th year and has funding for only part of a 6th year.

## What are the main programs of (MSP)<sup>2</sup>?

- A model for *professional development* that we've used with over 300 teachers
- *Dual enrollment* courses for over 300 students

Details and results are on the following pages.



### (MSP)<sup>2</sup> partner institutions:

- Prince George's County Public Schools
- Bowie State University
- Prince George's Community College
- Towson University
- The University of Maryland, College Park
- The University System of Maryland



# Professional Development (for teachers of grades 4-8)

Our successful model takes this approach:

## 1. Summer Institutes

College faculty and PG Science Office staff run 2-week workshops on science content and inquiry pedagogy.

## 2. School-year inquiry training

The Science Team runs series of workshops on:

- Inquiry instruction in science
- Advanced inquiry techniques
- Training the trainers - how to be a teacher leader in science

## 3. School-year classroom visits and mentoring

The Science Team meets with teachers individually three times per year.

Hands-on professional development for teachers



## Key strategy for success: the Science Team

In the PGCPS Science Office, 4 of the 7 full-time staff make up the (MSP)<sup>2</sup> Science Team. They provide the core of the professional development for teachers, designing and running workshops, visiting and mentoring teachers in making pedagogical innovations, and working with college faculty to run the summer institutes.

The Science Team is entirely grant-funded.

# Dual Enrollment (courses for high-schoolers)

Two different kinds of programs for giving students a leg up on college science:

## 1. Summer residential program at Bowie State

For three consecutive summers, students take courses in science, math, and college skills at Bowie State University. Two of the courses carry college credits in Biology and Chemistry. Approximately 100 students have participated. The program is called the *Pre-College Science Scholars Academy*.

## 2. School-day college courses

In the *College Presence* program, faculty from PG Community College come to 5 different high schools and teach courses for credit. More than 200 students have received college credit in this program.

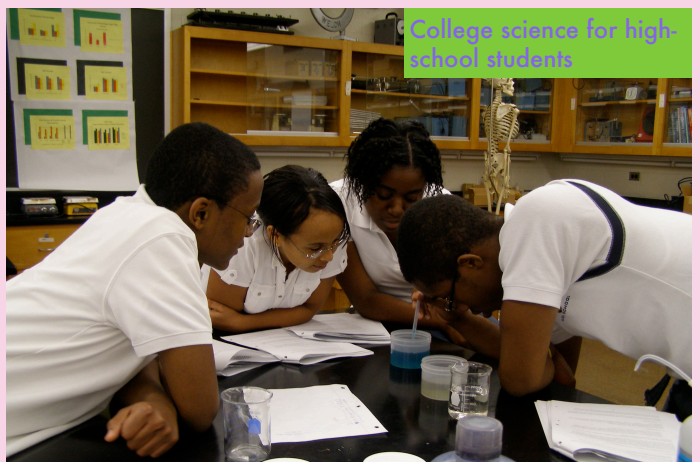
## Courses taught for dual credit:

- Biology
- Chemistry
- Environmental Biology
- Forensic Biology

## High schools where courses are taught:

- Bladensburg
- Central
- Largo
- Oxon Hill
- Gwynn Park

College science for high-school students



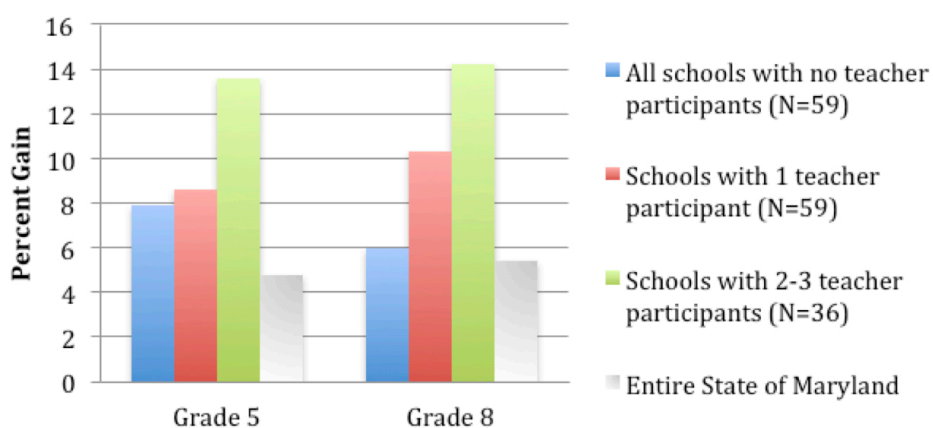
# Results of Professional Development

MSA gains show a positive effect:

*More teachers participating ⇒ higher MSA gains.*

Schools with more teachers participating in our professional development recorded larger gains in MSA pass rates over a 4-year period.

**Gains in Mean School-Level MSA Pass Rates in Science by (MSP)<sup>2</sup> Participation Status from 2009 to 2012**



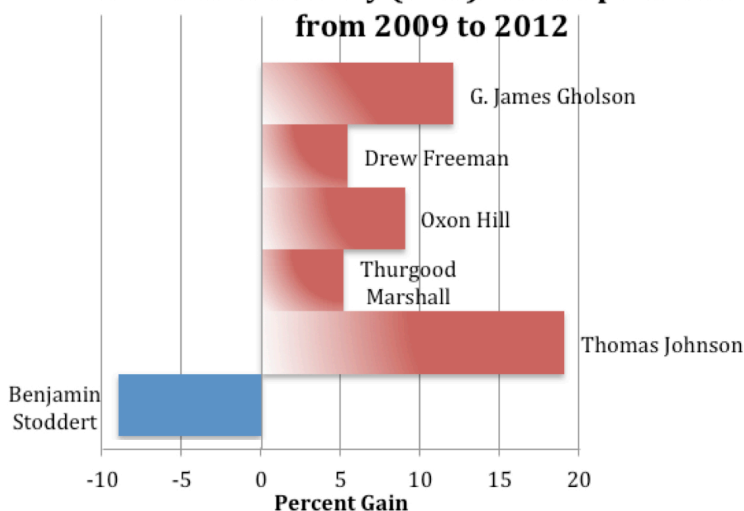
**Note: Data reflect mean school-level MSA pass rates in science (i.e., students who scored at the “proficient” or “advanced” level) in each category.**

TurnAround School gains are also promising

TurnAround schools where we have participating teachers show gains in pass rates.

\*Note: Teachers at G. James Gholson MS began participating only last year.

**Gains in Mean School-Level MSA Pass Rates in 8th-Grade Science by (MSP)<sup>2</sup> Participation Status from 2009 to 2012**



# Results of Dual Enrollment

Students are starting college with credit and extra science

More than 300 students are expected to earn 3,175 college credits by the end of summer 2013.

TurnAround schools where we have participating teachers show gains in pass rates.

\*Note: Teachers at G. James Gholson MS began participating only last year.

College credits awarded	Program	Through 2012	Expected in 2013	Total
to dual-enrollment students (to date, and expected)	PCSSA at Bowie State	249	140	389
	College Presence (taught by PGCC)	2,561	225	2,786
	Total	2,810	365	<b>3,175</b>





## MADE-CLEAR: Maryland and Delaware Climate Change Education, Assessment and Research

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### **Background**

MADE CLEAR is a 5-year, \$5.6MM implementation project awarded to the University System of Maryland (USM), as a part of the National Science Foundation's Climate Change Education Partnership (CCEP) Program. It follows the award of a 2-year, \$1.15MM CCEP planning grant also awarded to the USM partnership. The planning grant was one of 15 grants awarded from among 300 applications. The second round of funding was awarded to only 6 of the previous CCEP recipients.

Partners: University System of Maryland; University of Delaware; University of Maryland Center for Environmental Science; University of Maryland, College Park; and Towson University. Other collaborating partners are the Maryland State Department of Education; Delaware Department of Education; Maryland Public Television; Delaware State University and the Columbus Center for Science and Industry.

### **Mission and Purpose**

*MADE CLEAR focuses on ensuring that the current generation of students is able to make informed choices based on evidence, experiences, and trustworthy information about climate and climate change.* The overarching goal of MADE CLEAR is to build a sustainable capacity for effective and relevant climate change education within Maryland and Delaware and, through active evaluation, draw lessons that can be effectively applied elsewhere. Sustainable capacity will be bourne out through the inclusion of climate change education in and out of K-12 classrooms across the states, incorporation of climate change into ongoing, required professional development for middle school teachers in Maryland and Delaware, and through improved climate change education of preservice teachers at our partner Universities.

### **Core Initiatives:**

#### **1. *Climate Science Academies***

The MADE CLEAR Climate Academies to be held during Summer 2013 will be the kickoff to yearlong sustained professional for middle school educators in Maryland and Delaware. Over the course of five years, we expect to reach 380 middle school teachers in Maryland and Delaware. The Academies will address the challenging science content of climate science and consequences thereof and new national and state standards in education – Environmental Literacy Standards, Common Core Standards, and Next Generation Science Standards which will present educators at all levels with needs related to content, information on student learning, and professional development. Key elements include:

- The development of teacher/educator leaders in K-12 education, informal education, and higher education focused on reaching middle school students;
- Participation of MADE CLEAR Climate Science Advisors;
- Development and piloting of assessments linked to Next Generation Science Standards and Climate Literacy;
- Access to research on student understanding of climate science;
- Teacher and scientist tested educational materials.

## **2. *Mid Atlantic Climate Education Website***

Maryland Public Television will launch the Mid Atlantic Climate Education website in mid-June focused on providing educators with resources to embed climate science into their curriculum. The website will include an 1) Overview of Mid-Atlantic Climate Change, 2) Teaching Climate Literacy information to diverse audiences, and 3) Searchable Virtual Resource Center with hundreds of local and regional climate education resources

## **3. *Climate Science Advisors***

Our region is host to national and world experts in climate science, the consequences of climate change and solutions to address it. We have recruited a core set of 25 Climate Advisors to work directly with educators, providing scientific review of educational materials and actively participating in professional development for educators. We plan to work closely with this group to provide educators with opportunities to engage with scientists to gain a better understanding of local climate impacts and solutions, STEM careers related to climate change, and strategies to better communicate with their students and parents about climate change. This initiative will provide scientists an opportunity to fulfill grant requirements for broader impact and outreach, develop enhanced communications training, and fulfill stewardship and sustainability initiatives under the University President's Commitment to Climate Change.

## **Highlights, Progress and Success**

- Climate Change Summit in September 2011 with 230 attendees, and featuring keynote speaker Dr. John Holdren, the President's Advisor for Science and Technology
- Policy audits and white papers of educational, environmental and energy policies in Maryland and Delaware and progress on implementing curriculum component of the University President's Commitment to Climate Change.
- Development of three novel learning progressions used to assess student learning: sea level rise, extreme events, and urban heat.
- Workshops to build capacity for climate education for K-12, higher education, and informal educators that involved participants from Maryland and Delaware.

## **Goals and Objectives:**

Goal 1: Embed climate change science into formal and informal education in the region.

1. Engage the climate science community within the region in education.
2. Link climate change concepts to state environmental literacy and science standards,

provide materials to link to K-12, higher education, and informal education materials and curricula.

3. Identify, review, validate and, where necessary, develop appropriate and effective material resources for use in formal and informal education.
4. Use new and emerging technologies to support climate change learning and promote technological competence.

Goal 2: Build and sustain the capacity of educators to deepen student understanding of climate change.

1. Infuse undergraduate education with climate change science and choices to address impacts.
2. Enhance the climate change learning content of pre-service teacher preparation programs.
3. Include climate change in the in-service professional development for middle and high school teachers and informal educators.

Goal 3. Utilize learning principles and the sociocultural diversity of the region to develop effective, scalable, and transferable modes of climate change education.

1. Advance learning sciences research to create new understanding of how individuals from diverse backgrounds learn about climate change.
2. Assess approaches to professional development that foster changes in teacher knowledge, skills, and dispositions.
3. Explore how critical thinking related to climate change education is situated in different informal science education (ISE) institutions.

Goal 4: Advance policies and practices for climate change education in the region and beyond.

1. Influence and enhance state climate change education policies and practices.
2. Contribute to, and align with, emerging regional climate change policies and programs.



# MADE CLEAR

## Maryland Delaware Climate Change Education Research and Assessment

### LEADERSHIP TEAM

**Dr. Donald F. Boesch,**  
USM Vice Chancellor for Environmental Sustainability

**Dr. Nancy Brickhouse,**  
Univ. DE Deputy Provost

**Dr. Nancy Shapiro,**  
USM Assoc. Vice Chancellor for Academic Affairs

**Dr. Nancy Targett,**  
Dean, UD College of Earth, Ocean & Environment

### Vision Statement

MADE CLEAR will focus on ensuring that the current generation of students is able to make informed choices based on evidence, experiences, and trustworthy information about climate and climate change.

### Mission Statement

MADE CLEAR will embed climate change education into formal and informal education in Maryland and Delaware and build a sustainable capacity of educators to deepen student understanding of climate change challenges facing the region and the world as a whole. In doing so, MADE CLEAR will utilize the sociocultural diversity of region and key learning principles to develop models of climate change education that are effective, scalable and transferable.



### Why is Climate Education Needed?

Climate change will be one of the most significant challenges of our time and will require that our students have the ability to critically evaluate and make choices from multiple vantage points based on sound science. However, the basic understanding of the science behind climate change (e.g. how carbon molecules are transformed) and its implications is lacking in most middle and high school classrooms. Meanwhile students, teachers, and the general public are exposed on a daily basis to news articles, reports, and opinions regarding what is and is not climate change and what you should or should not be doing to reduce the impacts of climate change. A recent National Research Council report focused on climate change education in formal settings supports the concepts MADE CLEAR embraces: a) connecting global climate change to local changes, b) engaging educators in scientific research, c) sustained professional development with scientists, and d) policies and state supports for climate change education in standards and training opportunities. ([http://www.nap.edu/catalog.php?record\\_id=13435](http://www.nap.edu/catalog.php?record_id=13435))

An informed student population and highly trained educators to teach them will provide the basis for an informed citizenry able to make choices in their lifetimes regarding reducing carbon emissions, adapting to the changes in climate we are already experiencing, and to ultimately develop a workforce able to lead the way in innovative climate change science and its solutions. The need for the work MADE CLEAR is focused on is evident and cannot be fully realized in isolation. Our regional partners are critical to our success.





# WHAT IS MADE CLEAR DOING TO MOVE THE REGION FORWARD?

## Innovative climate change content

Maryland Public Television portal with resources aligned to state and national standards:

- Existing regional lessons, videos, and articles reviewed by teachers and scientists
- Climate stories and place based content around:
  - People-centric. Who I am and what I do?
  - How climate has changed or will change and how this affects me, my family, my likelihood, my community and/ or my local environment?
  - How are we or others adapting or will need to adapt to climate change?



## Climate Change Academies and Workshops



- NGSS and Environmental Literacy focused
- Multiday professional development: Teachers, University Faculty, Informal Educators
- Guided and co-developed by state Departments of Education and Science Supervisors
- Participation from climate science and solution experts in the region
- Online learning communities for year long engagement

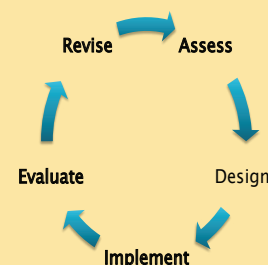
## Climate Science Advisers

- Experts in climate science and solutions from Universities, state and federal agencies and regional industries
- Active role in teacher training, expert review, rapid response to teacher inquiries, and out of classroom training and internships
- Opportunities for fulfilling grant requirements for broader impact and outreach, enhanced communications training, fulfilling stewardship and sustainability initiatives



## Research around policies and practices:

- Best practices for teaching climate change in diverse environments
- Guidance and assistance implementing NGSS and Environmental Literacy Standards
- Enhanced understanding of how adults and students learn
- Mechanisms for collaboration among higher education, K-12, and informal education



If you would like more info or to explore partnership opportunities:

Marcus Griswold, Project Manager ([griswold@umces.edu](mailto:griswold@umces.edu))

MADE CLEAR Website: [www.madeclear.org](http://www.madeclear.org)

Facebook: [www.facebook.com/climateeducation](http://www.facebook.com/climateeducation)



**University System of Maryland and the Business Higher Education Forum  
USM STEM Migration Analysis & Cybersecurity Network**

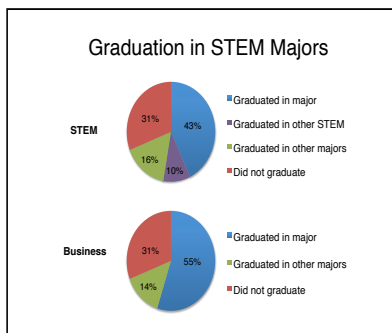
Funder	Sloan Foundation and Battelle
Award Amount to USM	\$134,400 from Sloan (total grant amount from Sloan is \$435K, remainder awarded to BHEF) and \$25,000 from Battelle
Grant Period	2012-2015
USM Research Team	Nancy Shapiro, Erin Knepler (VCAA) and Ben Passmore, Rebecca Bell (VCAF)
Project Director	Erin Knepler
Grant's alignment to USM's 2020 strategic plan	<ul style="list-style-type: none"> <li>• Theme 1: Access, Affordability and Attainment- Helping the State of Maryland achieve its goal of 55% college completion (associate's degrees through the baccalaureate) While Maintaining Quality.</li> <li>• Theme 2: Maryland's Economic Development and the Health and Quality of Life of Its Citizens- Ensuring Maryland's Competitiveness in the New Economy.</li> <li>• Theme 3: Transforming the Academic Model to Meet the Higher Education and Leadership Needs of Maryland's 21<sup>st</sup> Century Students, Citizens, and Businesses.</li> <li>• Theme 4: Identifying New and More Effective Ways to Build and Leverage the Resources Available to the USM for Benefit of Maryland and Its Citizens.</li> <li>• Theme 5: Most Importantly, Achieving and Sustaining National Eminence Through the Quality of Our People, Our Programs, and Our Facilities.</li> </ul>

**About the Study**

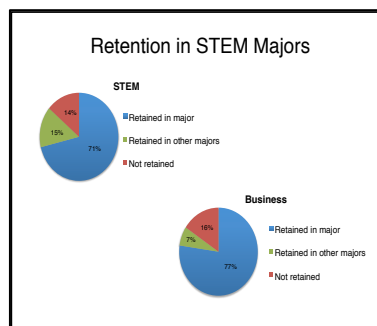
In order to gain a better understanding of the pathways of STEM undergraduates—what keeps majors moving forward, and what inhibits their progress and success, VCAA is conducting a STEM migration analysis. There are three phases of the study. Data mining conducted in spring 2012 by the USM Office of Institutional Research is Phase I of the study. Summary points are described below. The data are from three cohorts of first-time, full-time freshmen in 2003, 2004, and 2005 at four USM institutions (Bowie, Towson, UMBC, and UMCP) across three STEM majors (computer science, mathematics, and engineering); business majors are used as a control/comparison group (N = 3,958 for STEM and 2,305 for Business). Focus groups with students and faculty/administrators in computer science, engineering, math, and business (the control/comparison group) at the four USM institutions are currently underway; this is Phase II of the study. A key finding of the student and faculty/administrator focus groups so far is that STEM majors would benefit from greater involvement of career services offices on the four campuses. In light of this finding, with support from BHEF and Battelle, VCAA will explore the role career services plays and will begin conducting focus groups or interviews of career services offices on each of the four campuses; this is phase III of the study.

**Phase I**

The USM Office of Institutional Research mined the data from four USM institutions (i.e., three cohorts of first-time, full-time freshmen in 2003, 2004, and 2005) in spring 2012 comparing the migration out of the major, and retention and graduation patterns of STEM students in three entering cohorts of first-time freshmen at four USM institutions (UMCP, UB, UMES, and Towson) in three STEM majors (computer science, engineering, and mathematics). VCAF IR worked with the Office of Academic Affairs to analyze the data. Business majors were used as a control/comparison group in this study because business majors share characteristics of these STEM programs: high demand, limited enrollment programs with high entrance requirements. Key findings from Phase I of the study are detailed in the following five graphs.<sup>1</sup>

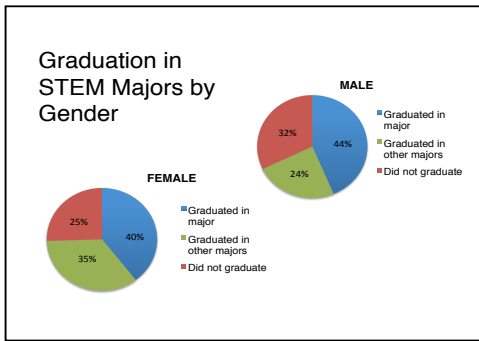


Entering STEM majors were more likely to change majors and graduate in a major outside of their entering STEM field than are entering business majors (26% vs. 14%).

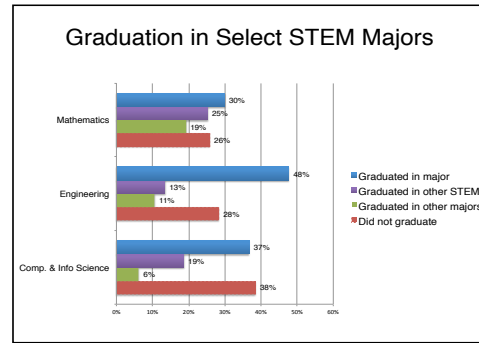


STEM students were twice as likely (15%) to leave their major for a different field than business students (7%).

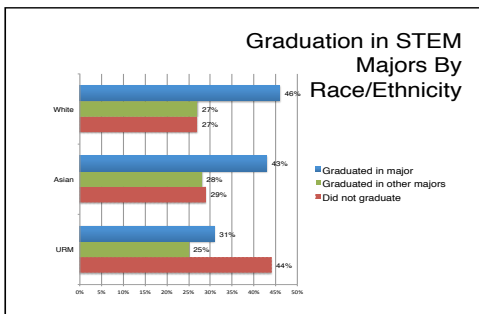
<sup>1</sup> Dr. Ben Passmore and Rebecca Bell, VCAF, mined and analyzed data.



Men and women graduate in their starting STEM field at roughly similar rates (44% vs. 40%)—different from the overall national trend of women graduating at higher rates than men. Additionally, women were more likely to graduate in a different field (35% vs. 24%) than men, and men were more likely to not graduate (32% vs. 25%) than women.



Computer science majors graduated in their major at somewhat higher rates (37%), but are least likely to graduate overall (38%). Engineering majors were the most likely to graduate in their area (48%) and least likely to switch to another STEM field (13%). Math majors were least likely to graduate in their original major (30%), but most likely to graduate overall (74%).



In STEM fields, an achievement gap persists for underrepresented minorities (URM) in both graduation rates and graduation within a STEM major. Specifically, 44% of URMs within the cohorts of this research study did not graduate.

## Phase II

The purpose of this phase is to review undergraduate science, technology, engineering, and mathematics (STEM) trends affecting the pipeline for STEM majors in chemistry, computer science and mathematics. Data is currently being collected through a series of focus groups with faculty and staff across these disciplines at the University of Maryland, College Park (UMCP), University of Maryland Baltimore County (UMBC), Bowie State University (BSU) and Towson University (TU). Students in business programs are also being used as a comparison group in Phase II. Ultimately the data will allow researchers and decision-makers to consider high-impact interventions to increase persistence and graduate rates in majors relevant to the state's workforce needs, with particular attention to the field of cybersecurity. To date, 13 student focus groups (approximately 130 students at UMCP and Towson) and seven faculty/administrator focus groups (approximately 35 faculty/administrators) have been conducted. The study anticipates conducting an additional 15-24 student focus groups (depending on funding and student response) and eight more faculty/administrator focus groups. This summer, VCAA will begin analyzing the focus group data from UMCP and Towson.

## Phase III

Based on interviews conducted to date, the involvement of career services offices on the four campuses has been a reoccurring theme in the student and faculty/administrator focus groups. Because of this, VCAA will explore the roles career services play and will begin conducting focus groups or interviews of career services personnel on each of the four campuses; this is phase III of the study being supported by BHEF and Battelle.

## Academic – Industry Involvement

In addition to the above-described study, the University System of Maryland (USM)-Business Higher Education Forum (BHEF) established the Undergraduate Cybersecurity Network as a key component of the Sloan Foundation Grant. The Network is a coalition of representatives from Maryland area higher education institutions, industry, government, and other stakeholder organizations joined together to create a strategic regional response to Maryland's, and the nation's, growing need for cybersecurity talent. With a focus on the undergraduate experience and the need to increase the recruitment and persistence of students, particularly women and underrepresented minorities, in cyber-related fields, the Network acts collaboratively to align the cyber workforce requirements of industry and government with higher education, develop innovative programs to expand the cyber talent pipeline, and address issues of critical interest to cyber workforce development.